

CLAIMS

1. A process for producing an electronic device material, comprising: forming a film on the surface of an electronic device substrate by using a plasma based on
5 microwave irradiation via a plane antenna member having a plurality of slits, in the presence of a process gas comprising at least a gas containing a film-forming substance and a rare gas.

2. A process for producing an electronic device
10 material according to claim 1, wherein the electronic device substrate is a semiconductor device substrate.

3. A process for producing an electronic device material according to claim 1 or 2, wherein the electronic device substrate mainly comprises Si.

4. A process for producing an electronic device
15 material according to any one of claims 1 to 3, wherein the film formation provides an insulating film formed on the substrate.

5. A process for producing an electronic device
20 material according to claim 4, wherein the film-forming substance is a film-forming substance for gate insulator of a field-effect transistor.

6. A process for producing an electronic device material according to claim 4 or 5, wherein the film-
25 forming substance for gate insulator comprises at least one substance selected from: SiO_2 , Si_3N_4 , Ta_2O_5 , ZrO_2 , HfO_2 , Al_2O_3 , La_2O_3 , TiO_2 , Y_2O_3 , BST (barium-strontium titanate (Ba,SrTiO_3)), Pr_2O_3 , Gd_2O_3 , CeO_2 and compounds of these substances.

7. A process for producing an electronic device
30 material according to any one of claims 1 to 6, wherein the process gas further contains an organic source (organometallic compound).

8. A process for producing an electronic device
35 material according to any one of claims 4 to 7, wherein the carbon concentration in the insulating film is 15% or less.

9. A process for producing an electronic device material according to claim 4, wherein the film-forming substance is a film-forming substance for an interlayer insulating film.

5 10. A process for producing an electronic device material according to claim 9, wherein the film-forming substance for the interlayer insulating film contains one or more atom selected from the group consisting of Si, C, O, F, N and H.

10 11. A process for producing an electronic device material according to any one of claims 1 to 10, wherein the plasma has an electron temperature of 2 eV or less and an electron density of $1 \times 10^{11}/\text{cm}^3$ or more.

15 12. A process for producing an electronic device material according to any one of claims 1 to 11, wherein the electronic device is a semiconductor device.